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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/574,863

04/06/2006

Yuichiro Sasaki

061282-0234

5536

53080 7590 10/04/2010  
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EXAMINER

FOURSON III, GEORGE R

ART UNIT

PAPER NUMBER

2823

MAIL DATE

DELIVERY MODE

10/04/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/574,863	<b>Applicant(s)</b> SASAKI ET AL.	
	<b>Examiner</b> George Fourson	<b>Art Unit</b> 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2010 and 28 September 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 31,33,34,36,37,40-48,50 and 51 is/are pending in the application.
- 4a) Of the above claim(s) 49 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 31,33,34,36,37,40-48,50 and 51 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/30/2010, 9/28/2010</u> .                                    | 6) <input type="checkbox"/> Other: _____                          |

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/28/2010 has been entered.

Claim 33 is objected to because of the following informalities: In claim 33, "mainly" should be replaced with language more descriptive of the quantity intended because the term "mainly" is subjective. The claims are treated for the purposes of the instant office action to require greater than 50 atomic percent He. Appropriate correction is required.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 31,33,34,36,37,40,41,43-46,49,50 and 51 rejected under 35 U.S.C. 103(a) as being unpatentable over Maydan et al 2004/0166612 in view of Zhang et al 2005/0196961 and Downey et al 2004/0235281.

Maydan et al '612 discloses plasma doping an SOI structure [0263] including co-implantation with helium [0293] wherein amorphization of the wafer surface occurs [0265]. The doping is followed by RTA which includes lamp heating or laser annealing [0322]. The claims do not require sequential amorphization and doping. See figures 3 and 4 which show the results of plasma doping wherein the plasma containing the dopant is diluted with helium.

The reference discloses, as an alternative to co-implantation, preamorphization using Xe or Ar prior to plasma doping [0036] the reference does not disclose a plasma consisting of He for this purpose or a plasma having more than 50 atomic percent He.

Zhang et al 2005/0196961 discloses amorphization using He, Ar or Xe plasma [0019] of a single crystalline Si substrate.

It would have been obvious to one of ordinary skill in the art to combine the teachings of Maydan '612 with those of Zhang et al 2005/0196961 to enable performing the disclosed amorphization step of Maydan '612 according to the teachings of Yang because in such a process the method of Zhang et al 2005/0196961 would be used according to its disclosed intended purpose and would therefore have reasonably been expected by one of ordinary skill in the art to yield the predictable results of forming the disclosed amorphized region of Maydan '612.

Maydan '612 does not disclose use of Xe lamp in the annealing step or provide guidance with respect to output of the lamp used for annealing with respect to wavelength.

Downey et al '281 discloses plasma doping of boron [0017] with preamorphization [0032] followed by activation annealing using Xe lamp having a substantial portion of its output in the 200-1100 nm range. The reference discloses that the wavelength region desired may be chosen by use of an optical filter, use of a different optical source or multiple optical sources [0040-0041]. The reference exemplifies use of an optical source having a range of 300-800 nm [0040]. The reference discloses wavelength range used to be a result effective variable by stating that "different illumination wavelengths can provide different junction-forming performance results" [0066-0067]. There is overlap between the recited range and that disclosed by Downey et al (MPEP 2144.05). Further, one of ordinary skill in the art would have been led to the recited range in view of the guidance provided by Downey et al to obtain desired junction-forming performance results.

It would have been obvious to one of ordinary skill in the art to combine the teachings of Maydan et al '612 and Downey et al to enable performing the disclosed lamp annealing step of Maydan et al '612 according to the teachings of Downey et al because in such a process the method of Downey et al would be used according to its disclosed intended purpose and would therefor have reasonably been expected by one of ordinary skill in the art to yield the predictable results of performing the disclosed lamp annealing step of Maydan et al. The resulting semiconductor would have the recited properties because the same materials are treated as in the instant invention.

Claims 42,47 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maydan '612 as applied to claims 31,33,34,36,37,40,41,43-46,50 and 51 above, and further in view of the following arguments.

The examiner takes official notice that use of silicon substrates having a (100) crystal orientation, strained Si substrates and glass substrates as SOI structures as recited was known prior to applicant's invention.

It would have been obvious to one of ordinary skill in the art to combine the known processes according to their known intended purposes with the process of Maydan '612 to enable providing the disclosed SOI substrate of Maydan '612 because in the process of the combination the known process would be employed according to their known intended purposes and would therefor reasonably have been expected to provide the predictable results of the disclosed substrate formation step of Maydan '612.

Applicant's arguments regarding Yang are moot in view of the new grounds of rejection above.

Applicant appears to argue that unexpected results are obtained using a He plasma in combination with light having the recited wavelengths. However, applicant has merely recognized results that flow from the process made obvious in view of the references relied on above. The absorption characteristics depicted would be obtained by following the teachings of the references relied on because they are a property of the

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resulting material of the processes made obvious in view of the references relied on above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Fourson whose telephone number is (571)272-1860/272-1860. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/George Fourson/  
Primary Examiner, Art Unit 2823

GFourson  
October 1, 2010